OPERATING INSTRUCTIONS

VISIC620
Visibility Measuring Device

Installation
Operation
Maintenance

SICK
Sensor Intelligence.

Document Information

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Glossary

Skilled persons: Persons who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the dangers involved.

Competent persons: Persons who, based on their technical training on, and knowledge concerning the specific device, as well as knowledge of the relevant regulations, can assess the tasks given and recognize the dangers involved.

Instructed persons: Persons properly instructed on the tasks assigned, possible risks and necessary protective measures.

Warning Symbols

Hazard (general)

Hazard by voltage

Hazard by high temperature or hot surfaces

Hazard through laser beam

Signal Words

DANGER
Immediate hazard which *will* result in severe personal injury or death.

WARNING
Risk or hazardous situation which *could* result in severe personal injury or death.

CAUTION
Hazard or unsafe practice which *could* result in personal injury *or* property damage.

Information Symbols

Important technical information for this device

Important information on electrical or electronic functions

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VISIC620

1 For your Safety

Safety information
Intended use
Responsibility of the operator

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1.1 Short summary of the most significant hazards

► Read and always observe the safety and warning information in these Operating Instructions.

WARNING: Danger through defective device

The VISIC620 is likely to be unsafe when it:

- Shows visible damage on the outside.
- Has been penetrated by moisture.
- Has been stored or operated under irregular conditions.

When safe operation is no longer possible:

► Put the VISIC620 out of operation, separate all connectors from the power supply and secure against unauthorized start-up.

WARNING: Hazard by laser radiation

Risk of eye damage

► Never look directly into the laser beam.

► Avoid laser beam reflections.

1.2 Basic Information

1.2.1 Detail level of these Operating Instructions

These Operating Instructions contain a fundamental description of the VISIC620 measuring system and serve as guide for installation, operation and scheduled maintenance.

They also contain information on safe operation of the VISIC620.

► Read and observe the corresponding Sections in these Operating Instructions.

1.2.2 Scope of application and identification

These Operating Instructions are applicable for:

- VISIC620 as from S/N 0640xxxx

The Identification number of the VISIC620 (type plate/device plate) is located on the outside next to the connector socket and on the side inside the receiver on the device floor.

1.2.3 Designated users

The VISIC620 may only be installed and put into operation by skilled persons who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the dangers involved.

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1.2.3.1 Responsibility of user

- Pay attention to the safety labels on the VISIC620 (see → P. 10, § 1.3)
- Only operate the VISIC620 according to the intended use (see → § 1.2.4)
- Follow all specifications in these Operating Instructions and only operate the VISIC620 as described in these Operating Instructions.
  Contact your local SICK representative before performing any work described where the information in these Operating Instructions is inadequate or capable of being misunderstood.
- Keep these Operating Instructions for future use.
- Pass these Operating Instructions on to a new owner.
- Pay attention to the prescribed maintenance work.
- Do not change any settings on or in the device and do not modify any components when such changes are not described in these Operating Instructions.
- In addition to the Operating Instructions, follow local laws, regulations and operating directives applicable at the respective installation location.

1.2.4 Intended use

The VISIC620 only serves to measure visibility on roads, in weather observation stations or on sea routes.

1.2.5 Further literature

1.2.5.1 Other instructions

- SOPAS ET Operating Software Manual

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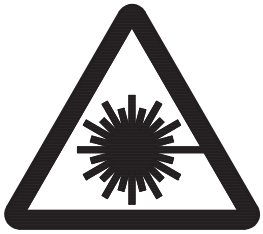
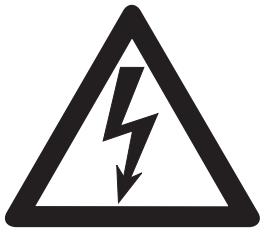
1.3 Safety and warning devices on the device

1.3.0.1 Warning labels on the device

Warning label	Location on device
	On the frontside in the center
	On the frontside in the center
	On the optional junction box on the front-side, at the bottom left

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VISIC620

2 Product Description

Device features
Functional principle
Device description

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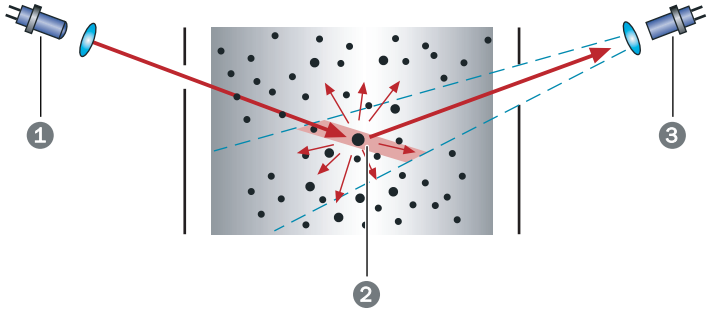
2.1 Functional principle

2.1.1 Measurement

The VISIC620 is a sensor system for continuous visibility measurement. The measuring principle is based on the diffusion of light by particles in a defined measuring volume. A laser beam is rayed into this measuring volume. The laser beam is scattered by the particles (drops of fog or dust) in the measuring volume. The amount of light scattered in a certain angle (30° here) is measured and serves as measure for particle density in the measuring volume.

Fig. 1 Measurement functional principle



1	Laser diode (sender)
2	Measuring volume
3	Receiver

A calibration function determines visibility using the measured signal. It is assumed that visibility conditions within a distance of 16 km are the same as in the measuring volume. The visibility determined in this manner is a standard value based on technical calculations and can differ considerably from the subjective visibility.

2.1.2 Contamination measurement

A control cycle is performed regularly for automatic contamination measurement of the VISIC620. A shutter opposite the laser diode is opened so that the laser beam passes through a transmission optic and reaches a fibre optic cable. The laser beam is redirected via this fibre optic cable and sent back directly to the receiver. The amount of light received is measured there and compared against a standard value (transmission measurement). This method checks the complete optical beam path for contamination or obstructions.

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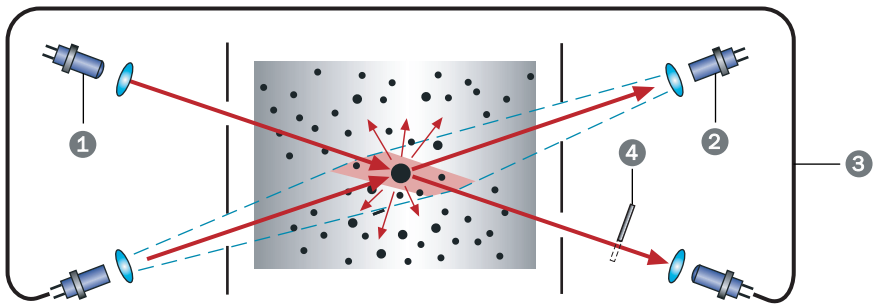
Fig. 2 Control cycle functional principle



1	Laser diode (sender)
2	Receiver
3	Fibre optic cable
4	Shutter

The control cycle lasts 2 seconds and can be time-triggered in fixed intervals and/or started using a PC with SOPAS ET (see → P. 24, § 4.2). The last measured value is output during the control cycle.

The signal of a precipitation detector can be read in as option on versions with a digital input and output via the associated serial interface.

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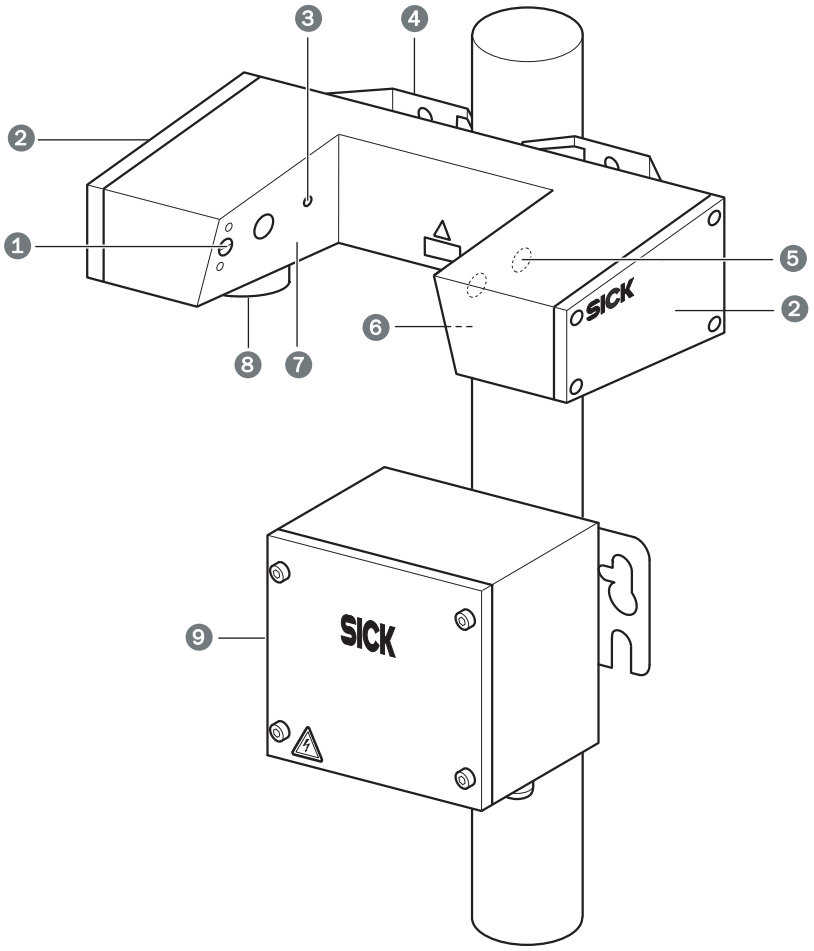
2.2 Device components/layout

Fig. 3 Device components



1	Aperture lock
2	Housing cover
3	Opening for laser diode (sender)
4	Mounting bracket
5	Opening for receiver
6	Aperture strut, right
7	Aperture strut, left
8	Connector socket
9	Junction box (optional)

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VISIC620

3 Installation

Transport
Assembly

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3.1 Transport

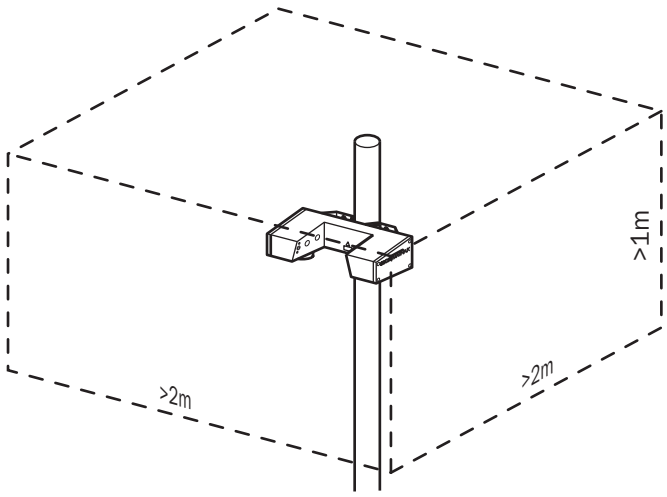
Only use the packing provided by SICK to transport the VISIC620. Warranty claims are void when this is not observed.
The packing can be obtained from SICK free of charge when required.

3.2 Measuring point selection

Observe the following criteria when selecting measuring points:

- The measuring point must be easily accessible. Any hazards for technicians when accessing measuring points (for example by road traffic) must be avoided as far as possible.
- Fit the VISIC620 at a height of at least 2.2 m when possible. The higher it is fitted, the lower the contamination.
- Do not fit the VISIC620 near buildings or trees because these can influence the number and particle size distribution of fog droplets in the measuring volume which means measured values will no longer be representative. Maintain the following minimum clearance when possible to achieve representative measured values:

Fig. 4 Clearance required



The VISIC620 also measures visibility in the measuring volume even when this clearance is not maintained. In this case though, the measured values are probably no longer representative for the surroundings.

- The VISIC620 can be fitted on a mast with diameter 50 to 140 mm or on a vertical plate.
- If a precipitation sensor is fitted on the same mast, this should be fitted above the VISIC620 and point in the opposite direction so that snow and icicles that can form on the sensor cannot drop or melt into the measuring volume of the VISIC620 (see → P. 17, Fig. 5).

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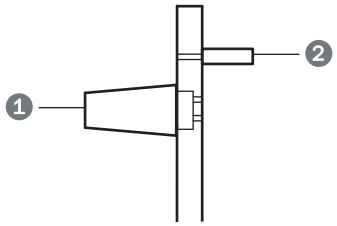
Fig. 5 Arrangement of the VISIC620 and precipitation sensor on a mast



1	VISIC620
2	Precipitation sensor

► Do not install any other devices above the VISIC620.

3.3 Material needed for installation

Material needed for installation (not included in scope of delivery):

- Connection lines (see → P. 19, §3.6.1)
- Fastening material (only for mast fitting):
  - For mast diameters 50 to 70 mm: Fixing bar with standard screws
  - For mast diameters 70 to 110 mm: Fixing bar with extra long M8 x 120 mm screws
  - For mast diameters 50 to 140 mm: Strap retainers
- Junction box, power supply unit, overvoltage protector as required
- Standard tools

3.4 Assembly preparation

► Secure the place of work.

► Provide power.

► Provide jack lift or stable ladder.

3.5 Assembly

Assembly work must only be performed by skilled persons familiar with assembly work.

There are three ways to fit the VISIC620:

- With a fixing bar on masts with diameters between 50 and 110 mm
- With strap retainers on masts with diameters between 50 and 140 mm
- With the built-in wall holder on vertical plates

3.5.1 Fitting on a mast with diameter 50 - 110 mm using a fixing bar

1 Retain the VISIC620 on the mast so that the U-shaped opening points in traffic movement direction.

2 Screw the fixing bar on from the rear using the enclosed M8 screws and washers as shown in → Fig. 6. Use 120 mm long screws to fix the fixing set when the mast diameter is larger than 75 mm.

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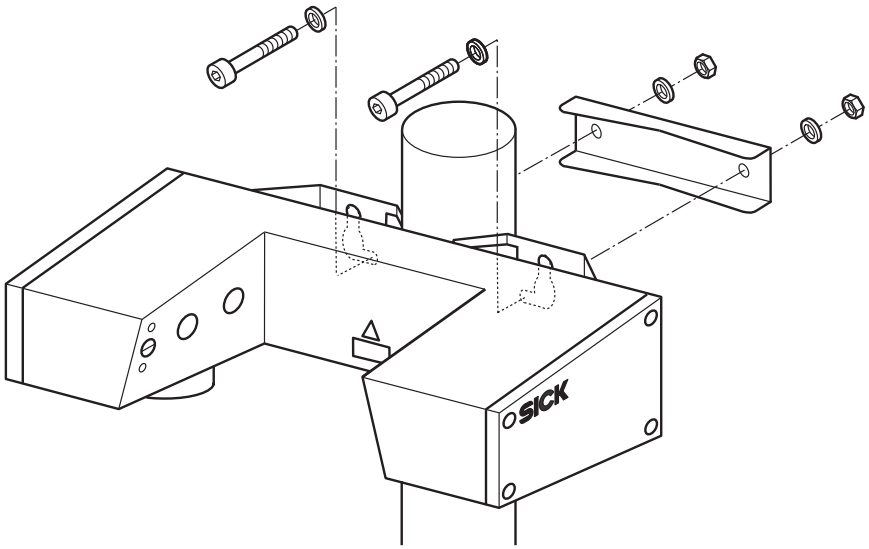
Fig. 6 Assembly with fixing bar



3.5.2 Fitting on a mast with diameter 50 - 140 mm using a strap retainer

1 Retain the VISIC620 on the mast so that the U-shaped opening points in traffic movement direction.

2 Thread the strap retainer through the wall holder, around the mast and into the tightener.

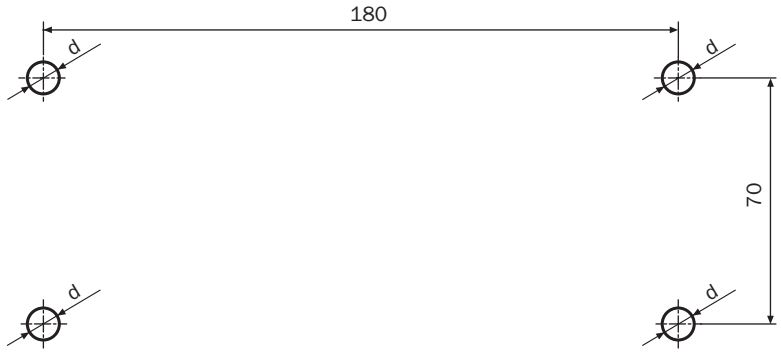
3 Turn the tightener screw to tension the strap retainer.

3.5.3 Assembly on vertical plate

> The VISIC620 can be fitted on a vertical plate using two or four screws. Use the two upper holes when only using two screws.

1 Drill openings for the wall holder according to the drilling plan (see → Fig. 7).

Fig. 7 Assembly drilling plan for wall holder



d	Hole diameter (depending on fixing material used)

2 Align the installation plate so that the U-shaped opening points in traffic movement direction.

3 Screw in four M12 screws with washers until they still protrude approx. 3 mm.

4 Hang the VISIC620 onto the screws with the wall holder.

5 Tighten screws completely.

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3.6 Electrical installation

WARNING: Danger through electrical voltage.
- ► Only allow an authorized electrician to work on the electric system.
- ► Observe the relevant safety regulations during all installation work.
- ► Take suitable protective measures against local risks and those arising from the plant.

3.6.1 Connection lines

The following connection lines may be used:

For	Line/type	Max. length	Cross-section
Digital input	A2Y(L)2Y	Depending on cable resistance	One pair of wires, 2 x 0.75 mm^2
Relay outputs	A2Y(L)2Y	Depending on cable resistance	Two pairs of wires, 2 x 0.75 mm^2
Modem	A2Y(L)2Y	Depending on cable resistance	Two pairs of wires
CAN bus	Li12YC11(TP) [1]	1000 m	Two pairs of wires
Analog output: 0 ... 20 mA	Screened and twisted in pairs	Depending on cable resistance (500 Ohm)	One pair of wires, 2 x 0.75 mm^2
RS485	Screened and twisted in pairs	1200 m	Three pairs of wires

[1] Unitronic LiHCH(TP) or equivalent cables can also be used

Warranty claims are void when you use cables not released by SICK for use with the VISIC620.

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3.6.2 Cabling

1 Connect the cables to the corresponding terminals in the junction box according to the following Table (depending on the interface used):

Cable assignment	Analog (possibly with GSM/GPRS module)	RS 485 (2/4 wires)	CAN	Modem	Pin
White	Relay 2	RD-/A	CAN-GND	a2	1
Brown	Relay 2	RD+/B	-	b2	2
Green	Relay 1	TD-	CAN-L	a1	3
Yellow	Relay 1	TD+	CAN-H	B1	4
Grey	GND	GND	GND	GND	5
Pink	+24 V	+24 V	+24 V	+24 V	6
Blue	Analog output (-)	Binary input (precipitation)	Binary input (precipitation)	Binary input (precipitation)	7
Red	Analog output (+)	Binary input (precipitation)	Binary input (precipitation)	Binary input (precipitation)	8
Cable shield	PE	PE	PE	PE	PE

Connect the 24 V to the corresponding terminals when using the GSM/GPRS module variant.

2 Connect cable shield to PE.

3 Install overvoltage protection for the following components when these are wired permanently:
- RS485 (2 or 4 wires)
- Modem
- Analog interface
- CAN bus
- 24 V connection

Create a low-impedance potential equalization on protective conductor PE when using overvoltage protector modules (equipment-specific).

4 Connect the signal lines in a junction box via terminals when using a precipitation sensor. (Junction box available from SICK, see → P. 48, § 7.3.3.)

5 Plug the connection cable between junction box and VISIC620 into the socket of the VISIC620.

Relay/connection	Explanation
Relay 1	Closed (triggered) when the device is running trouble-free in measuring operation. Open after fault, in Maintenance mode or Test mode during test measurements.
Relay 2	Closed (triggered) according to parameter settings (see → P. 25, § 4.2.4) when either the current visibility measured is under the limit set as parameter or a maintenance demand (cleaning) is pending.
Analog output	Outputs either visibility or scattered light intensity (live zero to 20 mA); see → P. 25, § 4.2.4 for parameter settings.
RS485	See Annex for protocols
CAN	Proprietary protocol - only in connection with the SICK Sensor Control Unit SCU.
Modem	See Annex for protocols

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3.6.3 Setting of terminating resistors for bus wiring

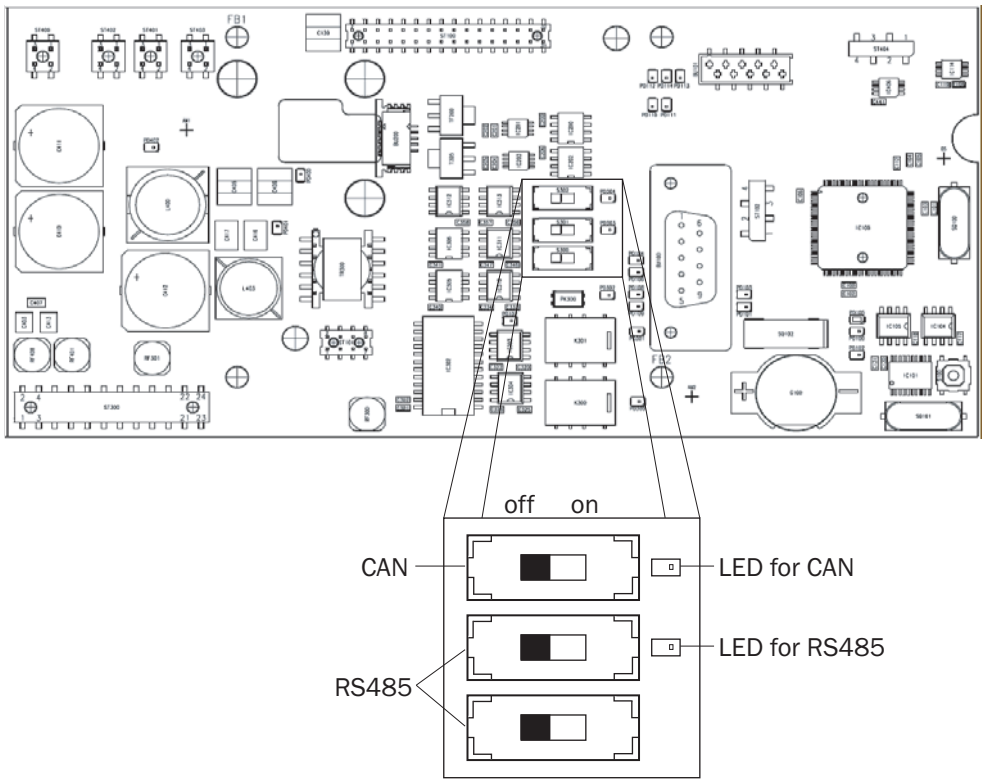
When VISIC620 is wired via a bus (RS485 or CAN) pay attention to the following:

1 On the devices at the end of the bus, activate the terminating resistor (see → Fig. 8).

2 On all other devices, deactivate the terminating resistor.

> The terminating resistors are activated at the factory.
> The respective LEDs light when the terminating resistors have been deactivated.

Fig. 8 Terminating resistors



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VISIC620

4 Start-up

Initial start-up
Restart
Parameter setting

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4.1 Overview

The VISIC620 may only be put into operation by competent persons who, based on their training on the device and knowledge of the device as well as knowledge of the relevant regulations, can assess the tasks given and recognize the dangers involved.

The SOPAS ET operating software serves to set the VISIC620 parameters.

4.2 SOPAS ET operating software

The SOPAS ET operating software can be used to save and archive the VISIC620 parameter as Project file on a PC. Measured values can also be read out.

4.2.1 SOPAS ET operating software functions for VISIC620 (Overview)

The Online Help of the SOPAS ET operating software (Help menu) describes the general functions of the software and how to use it.

- Menu language selection (German, English)
- Setting up communication with the VISIC620
- Password protected configuration for different operator levels
- Output current measured values
- System diagnostics

4.2.2 Installing and starting the operating software SOPAS ET

1 Start the PC and insert the Installation CD.

2 Call up start.html or start.pdf directly from the CD when installation does not start automatically.

3 Select the Menu item in the start file and follow the relevant instructions.

4.2.3 Basic setting for the SOPAS ET operating software

Parameter	Value
Operating interface language	English[1]
Unit of measure for lengths	Metric
User level	Maintenance technician
Download parameters when modified	Immediate, fail-safe in the VISIC620 EEPROM
Upload parameters after switching on-line	Automatic
Screen split	3 (project tree, help, workarea)

[1] The software must be restarted after changes

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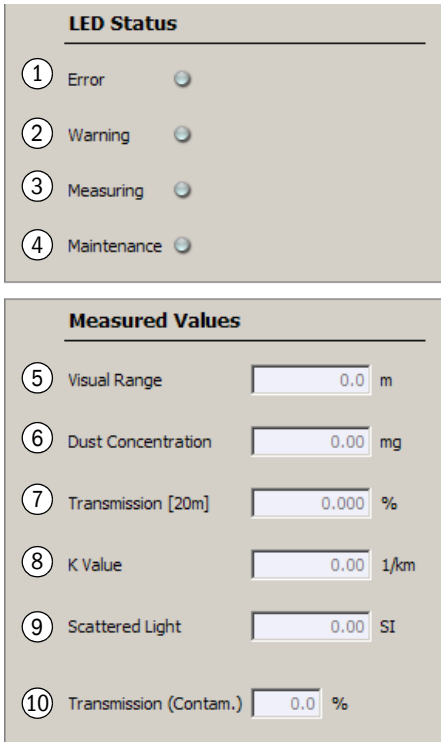
4.2.4 Description of register tabs for start-up

Various register tabs serve to set parameters. The register tabs required for normal start-up are described in the following. The Service Manual contains details of more complex start-ups, e.g., with switchover of the bus address or output of a protocol similar to WMO.

Fig. 9 VISIC620/Measured Values/Measured Values



1	Error message Red when an error is present.
2	Warning message Yellow when a warning message is present (see → P. 41, § 6.2).
3	Measuring operation Green when the VISIC620 runs in measuring operation.
4	Maintenance mode Yellow when the VISIC620 runs in Maintenance mode.
5	Visibility calculated in m
6	Indicates the dust concentration measured in the tunnel atmosphere. It is calculated on the basis of a calibration performed gravimetrically in real tunnels.
7	Indicates the measured transmission value which would be acquired by a transmissometer with an optical path length of 20 m.
8	Indicates the measured extinction coefficient (usual value in road tunnels).
9	Scattered light calculated in (0 ... 65536)
10	Transmission value calculated during the last control cycle (0 ... 100%; values over 100% indicate soiled windows during device adjustment).

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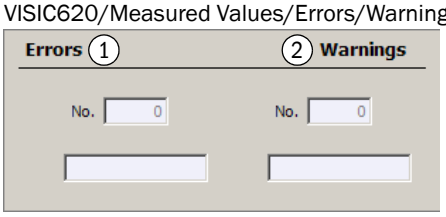
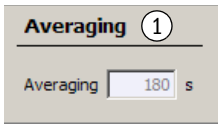
Fig. 10 VISIC620/Measured Values/Errors/Warnings



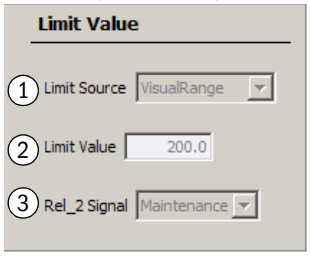
1	Number of error messages and error messages currently active.
2	Number of warning messages and warning messages currently active. List of all error and warning messages, see → P. 39, § 6

Fig. 11 VISIC620/Parameter/Averaging



1	Setting the averaging time in s (2 ... 300 s; default 180 s). Averaging time is the time after which most of the measured value changes (to 90%) are displayed (= t_{90}-time).

Fig. 12 VISIC620/Parameter/Limit Value



1	Measured variable to which the limit value below refers.
2	Limit value at which the relay should trigger (only effective when LIMITVALUE has been selected in REL_2 SIGNAL). The units shown in the “Measuring Values” register tab are applicable.
3	Output selection on relay 2 Maintenance: Relay triggers when the value is below the set WARNING LIMITS during transmission measurement. This indicates that the optical interfaces must be cleaned (see → P. 32, § 5.1) LimitValue: Relay triggers when the limit value entered above has been underflown (in visibility or transmission measurement) or overflown (in heat transmission coefficent, dust or scattered light measurements). A hysteresis of 10% of the limit value is applicable.

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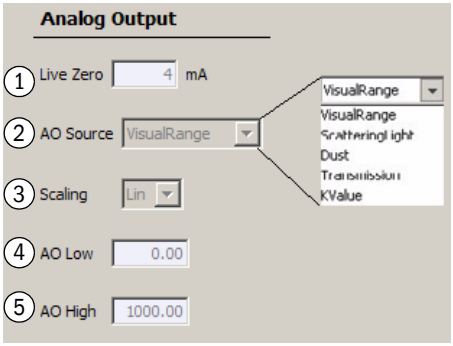
Fig. 13 VISIC620/Parameter/Analog Output



1	Analog output zero value (0; 2; 4 mA)
2	Value to be output via the analog output: VisualRange = visual range ScatteringLight = scattering light value Dust = dust concentration in mg/m³, according to standard calibration Transmission = transmission measured by a transmissometer with an optical path length of 20 m K value = extinction coefficient "heat transmission coefficient" in 1/km (usual in tunnels)
3	Setting whether analog output activation is linear or logarithmic.[1]
4	Lower limit of output range.
5	Upper limit of output range.

[1] Valid for linear:

$$\text{Measuring value} = \frac{I - LZ}{20mA - LZ} \cdot (AO_{High} - AO_{Low}) + AO_{Low}$$

or

$$I = (\text{Measuring value} - AO_{Low}) \cdot \frac{20mA - LZ}{AO_{High} - AO_{Low}} + LZ$$

Valid for logarithmic:

$$\text{Measuring value} = \left(\frac{AO_{High}}{AO_{Low}}\right)^{\frac{I - LZ}{20mA - LZ}} \cdot AO_{Low}$$

or

$$I = \log\left(\frac{\text{Measuring value}}{AO_{Low}}\right) \cdot \frac{20mA - LZ}{\log\left(\frac{AO_{High}}{AO_{Low}}\right)} + LZ$$

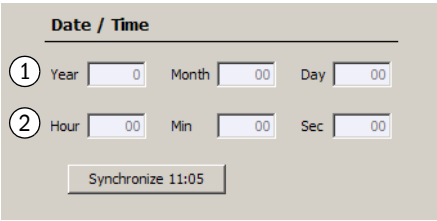
whereby

I = current at analog output

LZ = Live Zero

AO_{Low}/AO_{High} = lower/upper output range limits (when AO_{Low} is set to 0 m for logarithmic output, the internal calculation uses value 1 m to avoid division by zero.)

Fig. 14 VISIC620/Parameter/System Time



1	Date and time display.
2	Button to set the VISIC620 clock to the time of the connected PC.

Subject to change without notice

4.3 Putting the VISIC620 into operation with SOPAS ET

4.3.1 Creating a connection between VISIC620 and PC

4.3.1.1 Connect data interfaces

- ► Connect the PC (RS232 interface) and VISIC620 via an RS232 line.
- ► Insert the CD-ROM and call up start.html or start.pdf.
- ► Select the language.
- ► Select “Description of Communication” and continue to proceed accordingly.

4.3.2 Setting VISIC620 parameters

4.3.2.1 Select user level

The SOPAS ET operating software runs in the user level MAINTENANCE TECHNICIAN after start-up and parameters can only be read. Switch first to user level SERVICE in order to set device parameters using the SOPAS ET operating software.

1 Select the LOGIN ON DEVICE command in the TOOLS menu.

2 Select SERVICE in the USER LEVEL dialog screen, enter the password "visic620service" and click on LOGIN.

Further register tabs appear in the PROJECT TREE.

4.3.2.2 Settings for start-up.

> Double-click the name on a register tab to activate the respective register tab within the project tree.
> Use the right mouse button to open context boxes showing minimum, maximum and default values for entry boxes.

Various parameters must be set in order to put the VISIC620 into operation. These parameters are located in different register tabs. In the following, the folder in the project tree and the register tab are first shown and the data to be entered there.

1 MAINTENANCE -> OPERATING STATUS: Click on MAINTENANCE MODE to switch the VISIC620 into Maintenance mode so that no values are output on the analog output or relays.

2 PARAMETER -> INTEGRATION: Enter the desired integration time (60 ... 300 s; values below 60 s are only useful for service work and tests) in INTEGRATION.

3 If a second relay is used: PARAMETER -> LIMIT VALUE: Enter the limit value to trigger the relay or select MAINTENANCE CALL when this relay is to output a maintenance request.

4 If the analog output is used: PARAMETER -> ANALOG OUTPUT: Enter the desired parameter corresponding to the usage of the analog output (see also → P. 27, Fig. 13).

5 If the WMO protocol is used: PARAMETER -> SERIAL INTERFACE: Select the WMO protocol interface(s) in INTERFACE.

6 PARAMETER -> SYSTEM TIME: Click on SYNCHRONIZE to synchronize to the date and time on the connected PC.

7 DIAGNOSIS -> DEVICE ID: Enter the location of the VISIC620 in LOCATION NAME (optional).

8 MAINTENANCE -> TRANSMISSION MEASUREMENT: Check the values for WARNING LIMIT and ERROR LIMIT and correct when necessary.

9 MAINTENANCE -> TRANSMISSION MEASUREMENT: Click on START TRANSMISSION MEASUREMENT to perform a transmission measurement.
If the measured transmission is greater than or marginally lower than 100%, click on SAVE AS 100 % to save the value as reference value.
If the measured transmission is much lower than 100%, check the optical path, clean the windows (see → P. 32, § 5.1) and repeat the transmission measurement.

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10 MAINTENANCE -> OPERATING STATUS: Click on MEASURING MODE to switch the VISIC620 back into Measuring mode.

11 MEASURING VALUES -> ERRORS/WARNINGS: Check error and warning messages and clear the cause when necessary (see → P. 39, § 6).

12 MEASURING VALUES -> MEASURING VALUES: Check plausibility of measured values.

13 To save all the parameters, select the EXPORT DEVICE command in the PROJECT menu.

4.3.3 Saving, displaying and printing the current parameter record

When archiving parameters, it is recommended to print the file contents as well as saving the project file.

1 To save the current parameter set, select the SAVE PROJECT AS command in the PROJECT menu.

2 Enter a file name in the dialog window and confirm with SAVE.

The SOPAS ETSOPAS ET operating software stores the current settings in an SPR file.

3 To print the current parameter set, select the PRINT/PRINT PREVIEW command in the PROJECT menu.

The SOPAS ET operating software displays a preview of the tabular list of all parameter values.

4 Select the PRINT command in the FILE menu dialog window.

The PRINT dialog window opens to configure the printer.

5 Edit the settings as required and confirm with OK.

The current project settings are printed in tabular form over several pages.

Subject to change without notice

Subject to change without notice

VISIC620

5 Scheduled Maintenance

Maintenance work

Subject to change without notice

5.1 Cleaning

Clean the protective windows in front of the sender and receiver when soiled.

CAUTION: Incorrect measured values caused by hands or tools in the measuring volume or by missing apertures (risk of multiple reflection)
► Put the VISIC620 out of operation before cleaning.

1 Disconnect the VISIC620 connection plug.
2 Rotate the aperture lock half a turn counterclockwise.
3 Take aperture off.
4 Clean protective windows with following cleaning agents:
  – Clean optical system cloths, SICK Part No. 4 003 353
  – Screen cleaner (0.2 l spray), SICK Part No. 5 600 986
  – Possibly isopropyl, pure, for optical applications
5 Clean aperture struts.
6 Insert aperture and rotate shutter back.
7 Plug connection plug in.

The apertures must always be fitted when the VISIC620 is in operation otherwise multiple reflections can cause lower visibility values.

5.2 Diagnostic maintenance

A Service technician should perform a diagnostic maintenance at least every five years. This has two parts:

- Checking internal measured values
- Test measurements

The measured values must be compared against the nominal values here. If measured values are outside tolerances or malfunctions occur, see → P. 39, § 6.

Test measurements can be performed with or without a PC. Several control values can be checked during test measurements using a PC and SOPAS ET operating software (see → P. 34, § 5.2.2); only one value can be checked during test measurements without a PC (see → P. 38, § 5.3).

Subject to change without notice

5.2.1 Checking internal measured values

Prerequisite: The VISIC620 is connected to a PC with the SOPAS ET operating software installed.

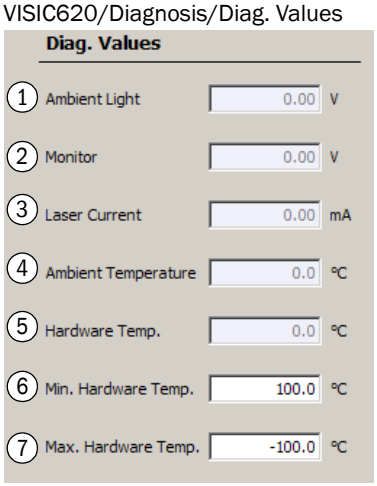
1 Start the SOPAS ET operating software on the PC (see → P. 28, § 4.3).

2 Select the LOGIN ON DEVICE command in the TOOLS menu.

3 Select SERVICE in the USER LEVEL dialog screen, enter the password "visic620service" and click on LOGIN.

4 Select register tab DIAG. VALUES in folder DIAGNOSIS in the project tree (from Service level).

Fig. 15 VISIC620/Diagnosis/Diag. Values


Diag. Values
1 Ambient Light 0.00 V
2 Monitor 0.00 V
3 Laser Current 0.00 mA
4 Ambient Temperature 0.0 °C
5 Hardware Temp. 0.0 °C
6 Min. Hardware Temp. 100.0 °C
7 Max. Hardware Temp. -100.0 °C

5 Check following values:

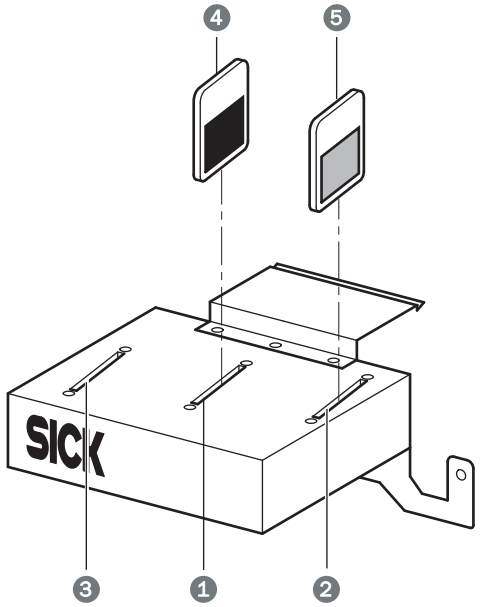
1	Ambient light (0 ... 3.9 V) Values above 3.9 V indicate a malfunction.
2	Laser beam brightness (2 ... 4.5 V) Values above 4.5 V indicate a device malfunction and the VISIC620 must be repaired. Values below 2 V indicate that the laser is too old and must be exchanged by SICK.
3	Laser current A warning is shown for values above 70 mA and the laser must be exchanged.
5	Current hardware temperature.
6	Lowest hardware temperature since the VISIC620 was started.
7	Highest hardware temperature since the VISIC620 was started.

Subject to change without notice

5.2.2 Test measurements with a PC

Test measurements are performed using a test tool.

Fig. 16 Test tool layout



1	Filter slot for the light scattering screen
2	Filter slot for the transmission filter
3	Filter slot for internal factory purposes (not required for test measurements)
4	Light scattering screen
5	Transmission filter

The test tool is a test device that must be handled carefully for correct testing.

- ► Protect optical surfaces from dust and moisture.
- ► Always keep the test tool in the case provided when not in use.
- ► Have the test tool checked every two years by either SICK or a Test Institute (transmission values of the grey glass filters at 650 nm).

Prerequisites for test measurement with a PC:

- The VISIC620 is connected to a PC with the SOPAS ET operating software installed to be able to read out measured values.
- The air in the measuring volume is so clear that the measured value remains above 2000 m.
- The VISIC620 windows are clean.

Test measurements comprise the following tasks:

- Prepare test measurements
- Perform test measurement with light scattering screen (measurement of a low visibility with a light scattering screen in filter slot 1)
- Test measurement with light scattering screen and filter (measurement of further, higher visibility values with a light scattering screen in filter slot 1 and a transmission filter in filter slot 2; "Filter Test Run")

Subject to change without notice

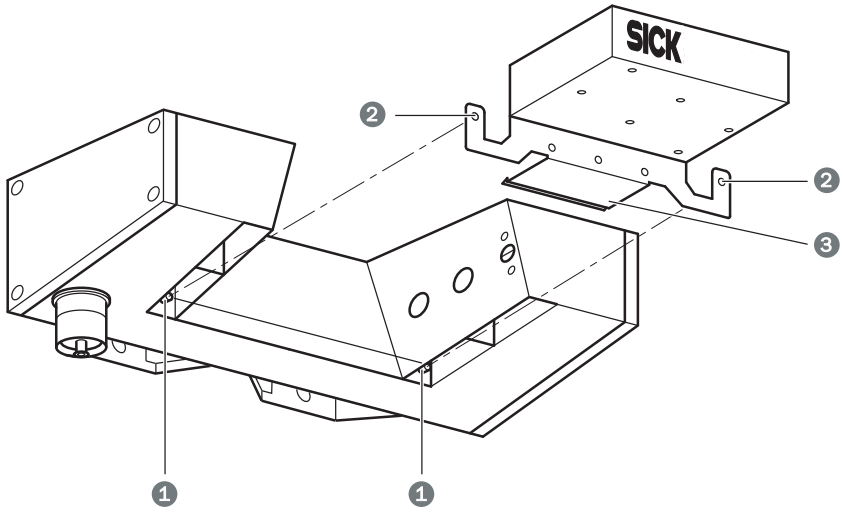
5.2.2.1 Prepare test measurements

CAUTION: Faulty operation during traffic management or similar actions possible

► Make sure the values measured during the test are not used actively for traffic management or similar actions.

1 Clean the VISIC620 (see → P. 32, § 5.1)
2 Start the SOPAS ET operating software on the PC (see → P. 28, § 4.3).
3 Select the LOGIN ON DEVICE command in the TOOLS menu.
4 Select SERVICE in the USER LEVEL dialog screen, enter the password and click on LOGIN.
5 Activate the OPERATING STATUS register tab in folder MAINTENANCE in the project tree.
6 Click on MEASURING MODE to switch the VISIC620 to Measuring mode.
7 Activate the MEASURING VALUES register tab in folder MEASURING VALUES.
8 Make sure the MEASURING control lamp in the DEVICE STATUS dialog box is green.
9 Activate the TEST MEASUREMENT register tab in folder MAINTENANCE
10 Click on TESTMODE ON to select suppressing measured value output during the test.
The malfunction relay is released and the outputs remain at 16000 m or the limit value set for the analog output (= 20 mA).
11 Click on TESTMODE OFF to select measured value output during the test.
The malfunction is triggered, when no other fault is present. The outputs run as normal.
12 Take the test tool out of the transport case. Take all filters and the light scattering screen out of the filter slots and store safely (for example in the transport case).
13 Connect the test tool, as described in → Fig. 17, to the VISIC620. At the same time, position the test tool so that the VISIC620 guide bolts seat in the test tool guide holes and the spring steel sheet has completely locked in.

Fig. 17 Fitting test tool on the VISIC620



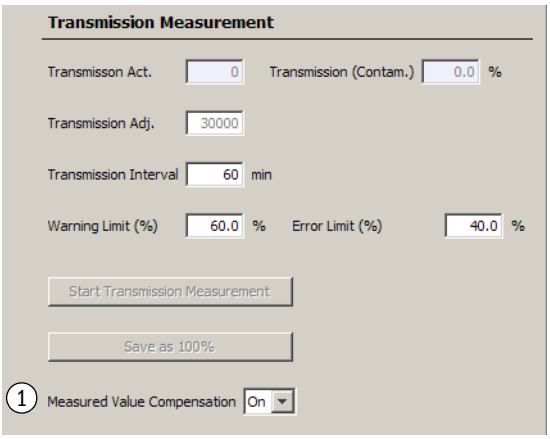
1	Guide bolts
2	Guide holes
3	Spring steel sheet to lock the test tool

Subject to change without notice

Use of the test tool is restricted when fog or vapor in the measuring volume cause measured values under 2000 m. The visibility test values must be clearly below this limit.
Visibility tolerances defined in the Technical Data (see → P. 44, § 7.1) are applicable for test measurements.

The following register tabs are used during test measurements:

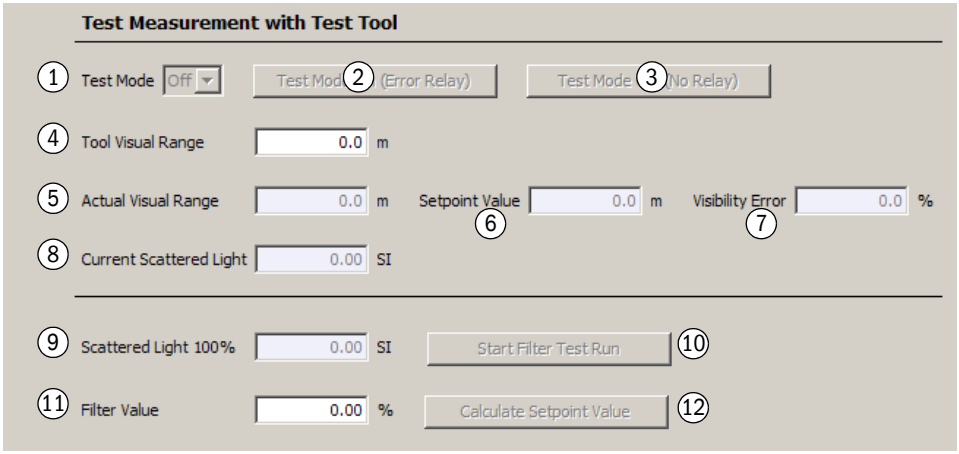
Fig. 18 VISIC620/Maintenance/Transmission Measurement



1	Set this parameter to OFF before a test measurement. After the test measurement, the parameter must be set back to the original set value.

Subject to change without notice

Fig. 19 VISIC620/Maintenance/Test Measurement



1	Selection box for Test mode (ON or OFF) When Test mode is switched on, the malfunction relay reports a malfunction and "maximum visibility" is reported on the outputs to prevent the test causing faulty operation in the traffic management system or other hosting system. The outputs and the malfunction relay operate normally when Test mode is switched off.
2	Button to activate Test mode
3	Button to deactivate Test mode
4	Entry box for VIS nominal value for the light scattering screen used
5	Actual measured visibility
6	Computed nominal value (is used in field 4). It is calculated from the transmission value (field 12) and the scattering light 100% value (field 9) for test measurements with transmission filters (= "Filter Test Run").
7	Deviation between nominal and actual value
8	Actual measured scattering light
9	Recorded scattering light measured value (clicking on START FILTER TEST RUN copies this value from field 8)
10	Button to copy the value from field 8 to field 9 where it serves as constant when calculating further visibility nominal values. This is necessary for test measurements with transmission filters (= "Filter Test Run").
11	Button to calculate a new nominal value from the transmission value (field 12) and the scattering light 100% value (field 9).
12	Entry box for transmission value of the filter used

5.2.2.2 **Test measurement with light scattering screen**

1 Activate the TEST MEASUREMENT register tab in the MAINTENANCE folder.

2 Insert the light scattering screen to the stop in the middle filter slot with the dark side to the right (see → Fig. 16).

3 Enter the VIS value noted on the light scattering screen in SOPAS ET in VISUAL RANGE OF TOOL (field 4 in → Fig. 18).

The value is copied to SET VALUE (field 6).

4 Wait until the integration time (up to 6 minutes) has elapsed at least twice.

The deviation between measured visibility value and nominal value is displayed in % in DEVIATION (field 7). Values SET VALUE and ACTUAL VALUE can be compared.

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5.2.2.3 **Test measurements with light scattering screen and filter (= "Filter Test Run")**

Prerequisite: The value SCATTERING LIGHT 100% (field 9) is stable, this means the integration time has elapsed at least twice since the last modification on the test tool.

1 Click on START FILTER TEST RUN.
   The value SCATTERING LIGHT 100% is taken from the current measurement and used as basis for the further measurements.
2 Enter the % value noted on the transmission filter in FILTER VALUE (field 12).
3 Click on CALCULATE SET VALUE.
   The new visibility nominal value is calculated and displayed in SET VALUE (field 6).
4 Insert a transmission filter to the stop in the right filter slot (position 2 in → Fig. 16).
5 Wait until the integration time (up to 6 minutes) has elapsed at least twice.
   The deviation between measured visibility value and nominal value is displayed in % in DEVIATION (field 7). Values SET VALUE and ACTUAL VALUE can be compared.
6 Remove the transmission filter and insert the other transmission filter to the stop in the right filter slot (position 2 in → Fig. 16).
7 Enter the % value noted on the transmission filter in FILTER VALUE (field 12) and click on CALCULATE SET VALUE.
8 Wait until the integration time (up to 6 minutes) has elapsed at least twice.
   The deviation between measured visibility value and nominal value is displayed in % in DEVIATION (field 7). Values SET VALUE and ACTUAL VALUE can be compared.
9 After the end of the test measurements, set the COMPENSATION MEASUREMENT VALUE parameter in the TRANSMISSION MEASUREMENT register tab to ON again if it was set to ON before this measurement.

5.3 Test measurements without a PC

CAUTION: Faulty operation during traffic management or similar actions possible

► Make sure the values measured during the test are not used actively for traffic management or similar actions.

Prerequisites for test measurement without a PC:

- The air in the measuring volume is so clear that the measured value remains above 2000 m.
- The VISIC620 windows are clean.

1 Connect the test tool, as described in → Fig. 17, to the VISIC620. At the same time, position the test tool so that the VISIC620 guide bolts seat in the test tool guide holes and the spring steel sheet has completely locked in.
2 Insert the light scattering screen to the stop in the middle filter slot with the dark side to the right (see → Fig. 16).
3 Read off the resulting measured value at a suitable location on the customer's plant.

Subject to change without notice

VISIC620

6 Troubleshooting

Error messages
Warning messages

Subject to change without notice

6.1 Error messages

Message	Description/cause	Clearance
EEPROM def.	Hardware fault in EEPROM	► Repair by SICK necessary.
	It is possible that no parameter set was loaded during a software update.	► Click RESET PARAMETER in register tab RESET In SOPAS.
Heater Wh	Defect on the window heating connected with white leads on the printed board (fibre optic cable)	► Check whether the plugs are connected correctly on the printed board; if yes, window exchange by SICK necessary.
Heater Bn	Defect on the window heating connected with brown leads on the printed board (laser)	
Heater Gy	Defect on the window heating connected with gray leads on the printed board (shutter)	
Heater Pk	Defect on the window heating connected with pink leads on the printed board (receiver)	
Heater Bk	Defect on the window heating connected with black leads on the printed board (housing on receiver side)	
Low Transm.	The value determined during the last transmission measurement is below the ERROR LIMIT entered in the MAINTENANCE -> TRANSMISSION MEASUREMENT register tab. Possible causes: – Contamination or object in optical path – Laser line cannot be readjusted further	► Clear window contamination or objects in optical path. ► Check LASER CURRENT and MONITOR values in DIAGNOSIS -> DIAG. VALUES register tab (see → P. 33, §5.2.1) and request repair by SICK when necessary (exchange laser).
Mon range	Monitor out of range (2.0 V - 4.5 V) Possible causes: – Laser degradation – Laser defective	► Request SICK to exchange the laser.
Amb. light	Ambient light (> 800 Dig./ 3.9 V after gain) Possible causes: – Device subjected to strong, direct light sources. Strong sunshine on the device side opposite the receiver can also cause this fault. – Device defective	► Align device to shut out direct light.

Subject to change without notice

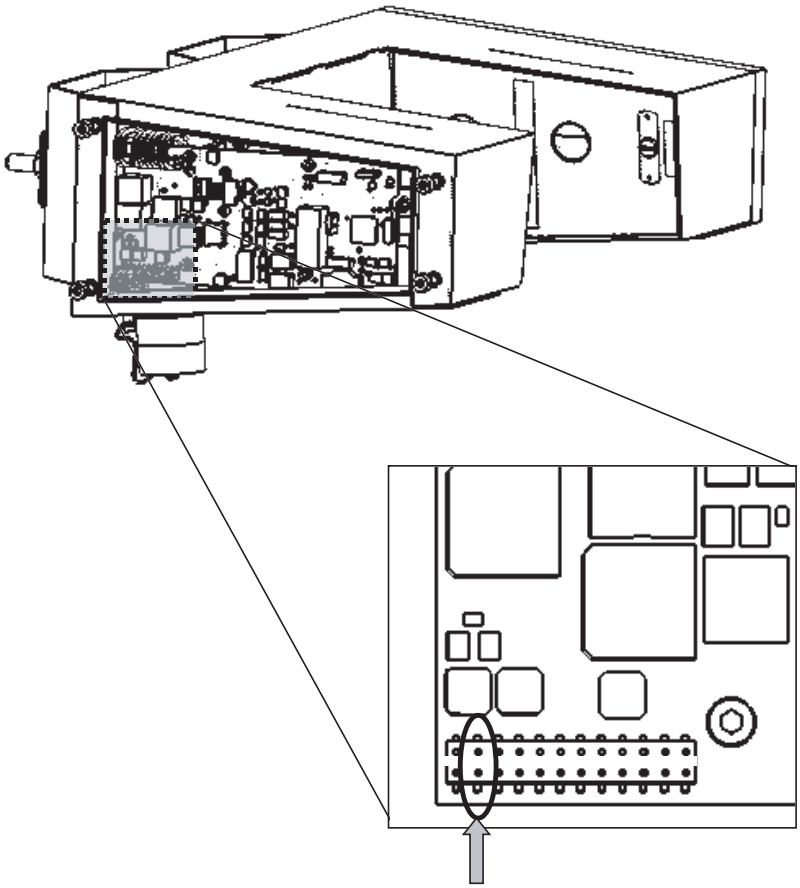
6.2 Warning messages

Message	Description/cause	
Vis. Limit	Visibility limit value underflown	
Low Transm.	The value determined during the last transmission measurement is below the WARNING LIMIT entered in the MAINTENANCE -> TRANSMISSION MEASUREMENT register tab. Possible causes: – Contamination or object in optical path	► Clean limit surfaces. ► Check optical path and remove any objects.
Laser Cur.	Laser current is outside permissible range. Possible cause: – Aging – ESD damage	► Exchange laser soon. If the message “Mon range” occurs at the same time, exchange laser immediately (repair by SICK).
V input min	Supply voltage lower than 17 V	► Check lines and cross-sections, change when necessary. ► Check lines and voltages of power supply unit used, exchange when necessary.
AO Status	Output value measured internally on the analog output does not match the nominal value determined internally. Possible cause: – Wiring error – Resistance in output current loop (load resistance) > 500 Ohm – On variants without analog output: Shorting jumper for analog output not connected – Hardware defective	► Check analog output wiring ► On variants without analog output: Check whether shorting jumper connected (see → P. 42, Fig. 20) ► Repair by SICK

The last 8 status messages of the VISIC620 can be viewed in SOPAS ET in Menu item “Diagnosis/Logbook”.

Subject to change without notice

Fig. 20 Shorting jumper slot for variant without analog output



Subject to change without notice

VISIC620

7 Technical Documentation

Operating data
Part numbers

Subject to change without notice

7.1 Operating data

Measured value recording	
Measured variable:	Visibility
Measuring range:	10...16.000 m Output range on analog output parameters can be set as required
Accuracy:	±5 m for visibility ≤ 50 m ±10% of measured value for visibility ≤ 5000 m ±20% of measured value for visibility ≤ 16000 m
Reproducibility:	±2% for visibility = 200 m
Setting time T_{90}:	2 ... 300 s

Device features	
Materials:	Housing made of stainless steel (1.4571), powder coated
Device dimensions:	(see → § 7.2)
Weight:	5.6 kg
Housing color:	RAL 7042 (Traffic grey A)

Ambient conditions	
Ambient temperature during operation:	-30 ... +55 °C (-22 ... +131 °F)
Ambient temperature during storage:	-40 ... +75 °C (-40 ... +167 °F)
Humidity exposure	0 ... 100 %
Degree of protection:	IP 69K[1]

[1] EN 60529

Interfaces and Signals					
VISIC620-	-1xxxx	-2xxxx	-3xxxx	-4xxxx	
Service interface	RS232 for Service				
Signals on connector contact – Analog output – Relay output – Digital input	 1x0 ... 20 mA, 2x48 V; DC max. 24 W; AC max 35 VA 1xfor potential-free contact (load 4 V/ 4.5 mA)	-	-	-	
Interfaces on connector contact	-	RS485 (4 wires or 2 wires)	CAN bus	Modem, cable connection	
VISIC620-	-14xxx			-42xxx	-43xxx
Modem	Radio modem GSM/GPRS			Analog, 56k, standard	Analog, 56k, further countries

Subject to change without notice

Electrical Data	
Supply voltage:	24 V DC ± 10%
Power input: – System: – With modem:	 Max. 7 W Max. 10 W

Optical data	
Light source:	Laser diode Wave length approx. 650 nm
Laser:	Class 2, acc. to IEC60825-1:2001
Receiver:	Photodiode Diffusion angle 30°

Subject to change without notice

7.2 Dimensions

Fig. 21 VISIC620 dimensions

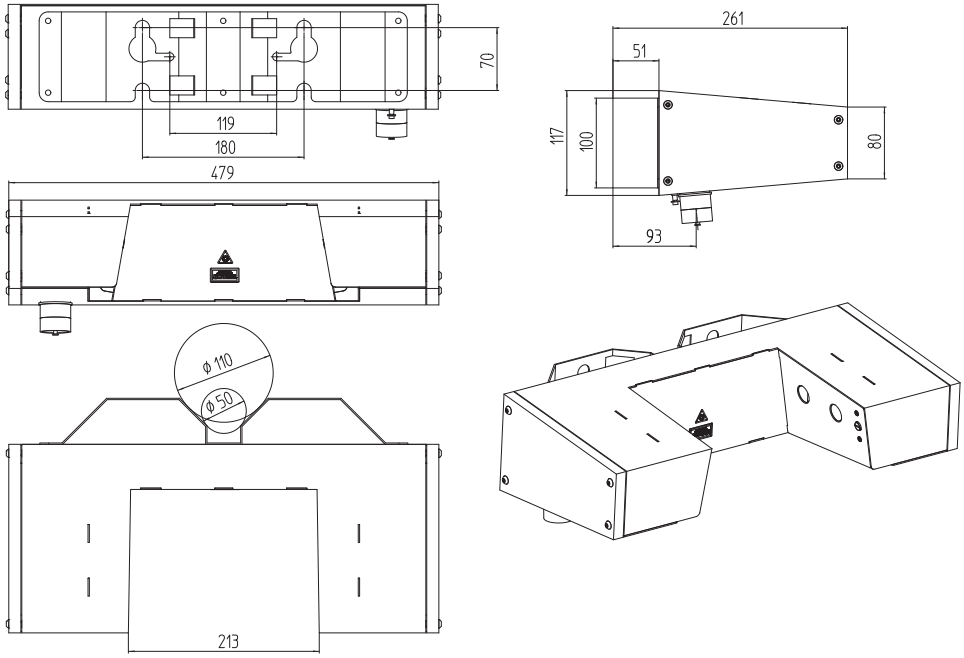
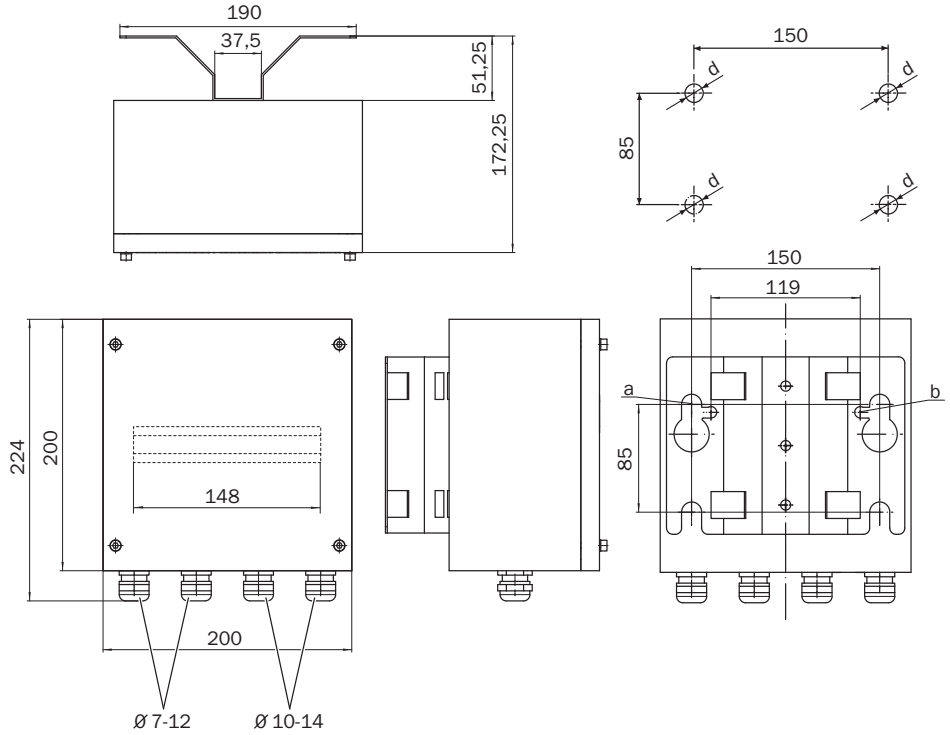


Fig. 22 Junction box dimensions



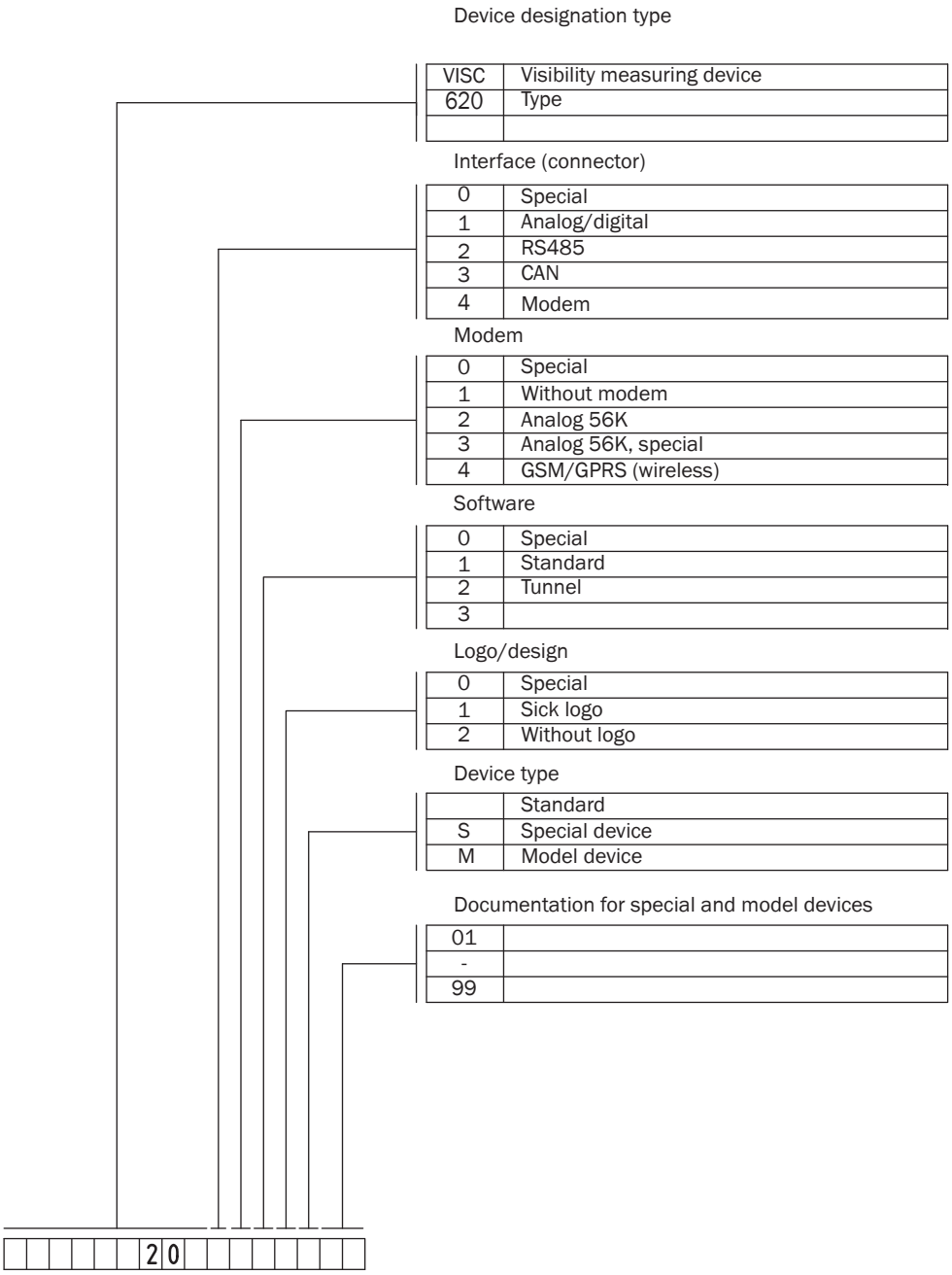
a	For wall mounting with M12
b	For mast mounting with M8
d	Hole diameter (depending on fixing material used)

Subject to change without notice

7.3 Part numbers

7.3.1 Type code

Fig. 23 Type code



Subject to change without notice

7.3.2 Spare and expendable parts

Part number	Designation
2034985	Aperture, left, complete
2034986	Aperture, right, complete
5312881	Pressure compensation element
6032682	Protective cap C16-3 for power socket
2039652	Subassembly: Power socket, fitting
6027624	Battery, CR1225
2034984	Housing cover

7.3.3 Accessories

Part number	Designation
2040230	Assembly kit for mast assembly with strap retainer and lock
2040231	Assembly kit for mast assembly with bar (50 ... 75 mm)
2041942	Assembly kit for mast assembly with bar (70 ... 110 mm)
2039664	Line with plug, rd., male plug/stranded cords 2m, 8-poles
2040224	Line with plug, rd., male plug/stranded cords 5m, 8-poles
2039369	Junction box, stainless steel 1.4571, with integrated mast/wall holder
2040232	Test set for VISIC620 in transport case with light scattering screen and two transmission filters
2049939	Modem, I-module GSM/GPRS
6011809	Precipitation sensor, IR
7028789	Power supply unit, Class II, 100...240VAC/24V DC/50W

Subject to change without notice

VISIC620

8 Annex

Protocols

Subject to change without notice

8.1 Protocols

8.1.1 Notation

The protocol description shows the individual bytes. Each byte is shown in square brackets <>. Contents can be:

- Abbreviation such as <CS> for "CheckSum" or <ADR> for address
- Single ASCII characters such as < ASCII 64> or <'@'>
- Consecutive ASCII characters such as <'SHOW AV'>
- Digit sequences as ASCII character sequence such as <nnn> for a three digit number
- Hexadecimal value prefixed with "0x" such as <0x80>

The bits in bytes, words and doublewords are shown with bit 0 as the least significant bit.

8.1.2 Special characters

Special characters	ASCII code of the character
<STX>	ASCII 02
<ETX>	ASCII 03
<ENQ>	ASCII 05

All these characters are reserved for framing or handshakes.

8.1.3 Interface parameters

- 9600 baud
- 8 bits/character
- 1 stop bit
- Start bit
- No parity
- No XON/XOFF handshake
- No CTS/RTS handshake
- No DTR/DTS signals

8.1.4 Available protocols

The serial interfaces of the VISIC620 can use various protocols:

- Protocol based on the WMO recommendations where data are output spontaneously from the sensor to the interface (without polling)
- Proprietary VISIC620 protocol where data are only transferred on request (polling)

Subject to change without notice

8.1.5 Coding

The normal ASCII code (7-bit) is generally used. The following method is used to convert a number contained in a byte to ASCII characters:

8 bits as 2 ASCII

This method examines a byte from left to right from the most significant to the least significant bit, converts it into two 4-bit numbers and shows these numbers as the ASCII code for the respective hexadecimal number. Example:

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Example	0	1	1	0	1	1	1	0

1st ASCII character (6) 2nd ASCII character (D)

8.1.6 VISIC620 protocol

Protocol framework

The VISIC620 is polled using a certain protocol framework that the VISIC620 can also comply with (see Table). The VISIC620 can however also be activated without framing over the RS232 Service interface and then does not return this either.

Byte index	Contents	Coding	Description
0	<STX>	ASCII	Start character
1	<ADR_H> (high byte)	ASCII	Address; For example, "03" is sent in polling (this means the device with address 3), the VISIC620 always replies with "00"
2	<ADR_L> (low byte)	ASCII	
3...n	<Data string>	ASCII	Polling command (for example, "m" or "SHOW AV") or demanded VISIC620 data
n+1	<ETX>	ASCII	Character for data end
n+2	<CS_1>	Byte	Checksum 1st byte = (check byte [1]) AND 0x0F) OR 0x30
n+3	<CS_2>	Byte	Checksum 2nd byte = (check byte 1) AND 0x0F) >> 4) OR 0x30
n+4	<ENQ>	ASCII	Character for telegram end

[1]Check byte = XOR on address and data string

Reading out device data with "SHOW AV"

Polling normally runs with the "SHOW AV" command as data string. This command creates a reply telegram (see description below) containing all the relevant device information so that no further commands are necessary.

The reply is split into 7 sections that are transferred together. Each starts with a letter identifier followed by data.

Request string:

<STX><ADR_H><ADR_L><'SHOW AV'><ETX><CS_1><CS_2><ENQ>

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Reply string

Id.	Contents	Coding	Description
1	<STX>	ASCII	Start character
2	<‘0‘>	ASCII	Address "00"; This address value is also used when a different address is set on the sensor.
3	<‘0‘>	ASCII	
4	<‘S‘>	ASCII	Identifier for Section 1 "Operational states"
5	<n>	ASCII	"1" = Measuring operation "5" = Maintenance operation
6	<‘0‘>	ASCII	Fixed, only present for compatibility to previous products
7	<‘MA‘>	ASCII	Identifier for Section 2 "Error status"
8	<nn>	8 bits as 2 ASCII characters	Bit 0: Error due to contamination Bit 1: Monitor diode outside permissible range Bit 2: Ambient light too bright Bit 3: Heater "wh" defective[1] Bit 4: Heater "bn" defective [1] Bit 5: Heater "gy" defective [1] Bit 6: Heater "pk" defective [1] Bit 7: Housing heating defective
9	<‘WA‘>	ASCII	Identifier for Section 3 "Warnings"
10	<nn>	8 bits as 2 ASCII characters	Bit 0: Warning due to contamination Bit 1: Precipitation
11	<‘ST‘>	ASCII	Identifier for Section 4 "Status code"
12	<nn>	8 bits as 2 ASCII characters	Bit 0: Limit value underflown Bit 5: Gain switchover active
13	<‘M1‘>	ASCII	Measured value index 1: Scattered light in scattered light units (0 to 2^{16})
14	<nnnnn.n>	ASCII	Scattered light measured value (in scattered light units)
15	<‘M2‘>	ASCII	Measured value index 2: Visibility
16	<nnnnnn>	ASCII	Visibility in m
17	<‘M3‘>	ASCII	Measured value index 3: No measured value [2]
18	<‘0.0‘>	ASCII	Fixed value [2]
19	<‘M4‘>	ASCII	Measured value index 4: Brightness
20	<nnn>	ASCII	Brightness measured value in V
21	<‘P1‘>	ASCII	Parameter index 1: No significance [2]
22	<‘0.0‘>	ASCII	Fixed value [2]
23	<‘P2‘>	ASCII	Parameter index 2: No significance [2]
24	<‘0.0‘>	ASCII	Fixed value [2]
25	<‘P3‘>	ASCII	Parameter index 4: Transmission (contamination)
26	<n.nn>	ASCII	Measured value - transmission (0 corresponds to 0%, 1 corresponds to 100%)
27	<‘P4‘>	ASCII	Parameter index 4: Device temperature
28	<nn.n>	ASCII	Measured value of device temperature in °C
29	<‘DI‘>	ASCII	Identifier for Section 7: "Binary inputs"
30	<nn>	8 bits as 2 ASCII characters	Bit 0: Binary input state (normally for precipitation detection; 0= closed, 1=open)

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Id.	Contents	Coding	Description
31	<ETX>	ASCII	Character for data end
32	<CS1>	Byte	Checksum 1st byte (Check byte [3]) AND 0x0F) OR 0x30
33	<CS2>	Byte	Checksum 2nd byte (Check byte 3) AND 0x0F) >> 4) OR 0x30
34	<ENQ>	ASCII	Character for telegram end

[1]Assignment see → P. 40, § 6.1
[2]Only required for compatibility to previous products
[3]Check byte = XOR on address and data string

8.1.7 Protocol based on WMO

The data are coded based on SYNOP and METAR. One measuring value is output in each telegram. This telegram is output automatically once per minute. The measured value in the METAR protocol is replaced by "?????" when a sensor error occurs. The data are separated by ";". The telegram is terminated with CRLF.

Pos.	Contents	Coding	Description
1	<'$'>	ASCII	Start character
2	<'VISIC620'>	ASCII	Device type
3	<';'>	ASCII	Separation character
4	<nnnnnnn>	ASCII	Device serial number
5	<';'>	ASCII	Separation character
6	<nn>	ASCII	Measured value coded according to SYNOP code (see below)
7	<';'>	ASCII	Separation character
8	<METAR>	ASCII	Visibility measured value classified according to METAR: <'+FG'> Thick fog; 0 ... 200 m <'FG'> Fog; 200 m ... 500 m <'-FG'> Light fog 500 m ... 1000 m <' '> Over 1000 m
9	<';'>	ASCII	Separation character
10	<nn>	ASCII	Identical to field 6
11	<';'>	ASCII	Separation character
12	<METAR>	ASCII	Identical to field 8
13	<';'>	ASCII	Separation character
14	<nnnnn>	ASCII	Visibility in m with the integration time set in the device (five digits with leading zeros)
15	<';'>	ASCII	Separation character
16	<nn/nn/nn>	ASCII	Date as yy/mm/dd
17	<';'>	ASCII	Separation character
18	<nn:nn>	ASCII	Time as hh:ss
19	<';'>	ASCII	Separation character
20	<nnnnnnnn>	ASCII	Device status (see → P. 54, § 8.1.8); Note: If the device status displays an error, the measured values (including the coded or classified) are padded with the appropriate number of question marks

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Example:

- Example 130 m (thick fog)
  $VISIC620;1234567;01;+FG;01;+FG;00130;06/09/07;10:15,00000000
- Example 360 m
  $VISIC620;1234567;03; FG;03; FG;00360;06/09/07;11:15,00000000
- Example 800 m (light fog)
  $VISIC620;1234567;08;-FG;08;-FG;00800;06/09/07;13:15,00000000
- Example 2600 m
  $VISIC620;1234567;26;+FG;26;+FG;02600;06/09/07,10:15,00000000
- Example 11000 m
  $VISIC620;1234567;61; ;61; ;11000;06/09/07,10:15,00000000
- Example sensor error active
  $VISIC620;1234567;??;???;??;???;16000;06/09/07,10:15,00004400

Code	Km	M	Code	Km	M	Code	Km	M	Code	Km
00	<0.1	<100	17	1.7	1700	34	3.4	3400	51	Not used
01	0.1	100	18	1.8	1800	35	3.5	3500	52	Not used
02	0.2	200	19	1.9	1900	36	3.6	3600	53	Not used
03	0.3	300	20	2.0	2000	37	3.7	3700	54	Not used
04	0.4	400	21	2.1	2100	38	3.8	3800	55	Not used
05	0.5	500	22	2.2	2200	39	3.9	3900	56	6
06	0.6	600	23	2.3	2300	40	4.0	4000	57	7
07	0.7	700	24	2.4	2400	41	4.1	4100	58	8
08	0.8	800	25	2.5	2500	42	4.2	4200	59	9
09	0.9	900	26	2.6	2600	43	4.3	4300	60	10
10	1.0	1000	27	2.7	2700	44	4.4	4400	61	11
11	1.1	1100	28	2.8	2800	45	4.5	4500	62	12
12	1.2	1200	29	2.9	2900	46	4.6	4600	63	13
13	1.3	1300	30	3.0	3000	47	4.7	4700	64	14
14	1.4	1400	31	3.1	3100	48	4.8	4800	65	15
15	1.5	1500	32	3.2	3200	49	4.9	4900	66	16
16	1.6	1600	33	3.3	3300	50	5.0	5000	67	17

Note: The highest code value below the respective current measured value is used.

8.1.8 Device status

The device status comprises 4 * 8 bits with the significance shown below.

Status:	Byte 4	Byte 3	Byte 2	Byte 1

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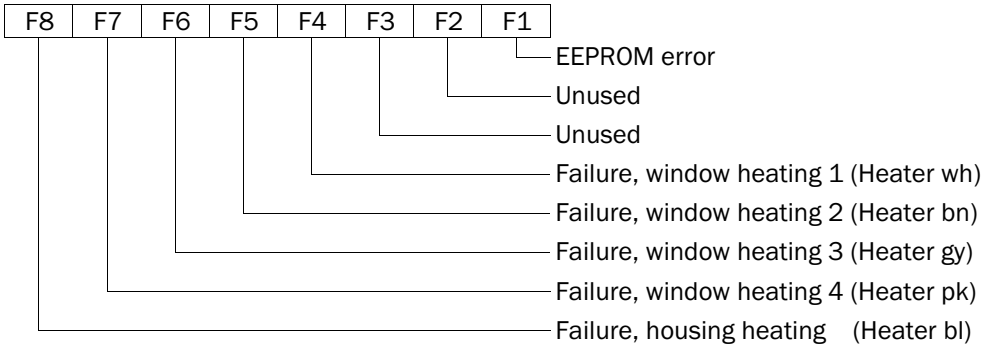
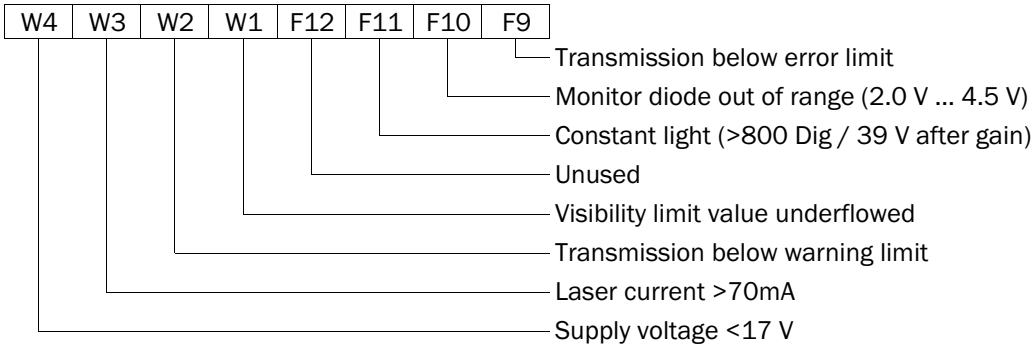
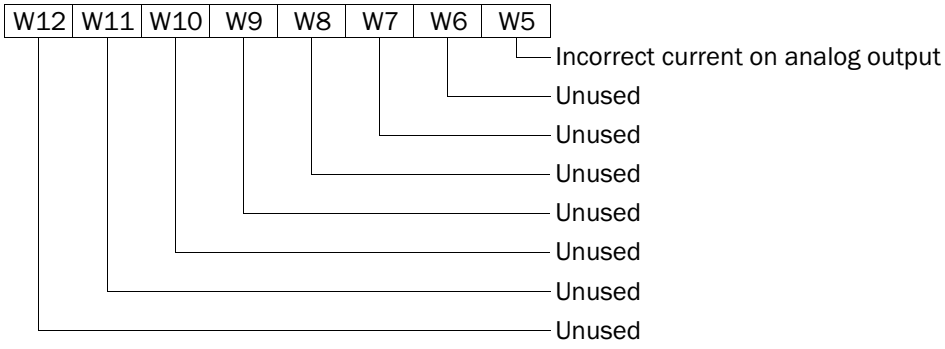
Byte 1: Error



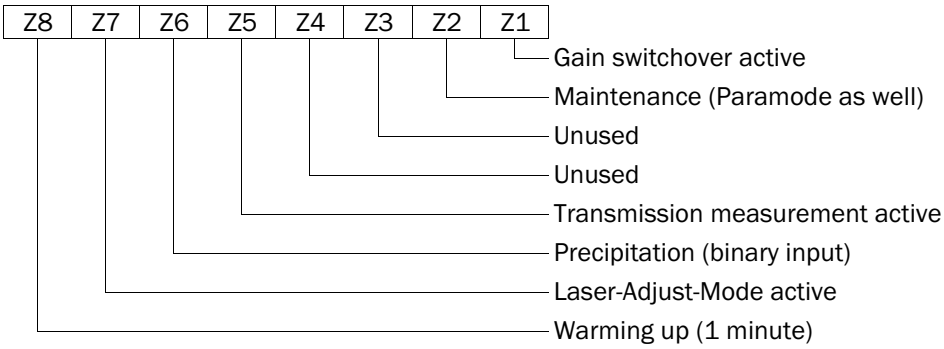
Byte 2: Error/warnings



Byte 3: Warnings



Byte 4: Device status



Subject to change without notice

Example:

Status: 01 00 11 40

Byte	Significance
Byte 1: 40	Error, window heating 4 failure (heater pk)
Byte 2: 11	Error, transmission too low, warning visibility limit value underflown
Byte 3: 00	
Byte 4: 01	Gain switchover active

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C
Cable assignment 20
Clearance 16

M
Measuring principle 12

S
Shutter 12
SOPAS ET 24

T
Test tool 34

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